

Amendments to the Claims

The current listing of the claims replaces all previous amendments and listings of the claims.

1. (Currently Amended) An electronic component holding head for holding an electronic component to be mounted to a substrate, comprising:

a main electronic component holding unit;

a vacuum chucking part provided on said main electronic component holding unit so as to face the surface of the electronic component to be held by vacuum chucking, so that the electronic component is held by vacuum chucking to said main electronic component holding unit; and

a light path part ~~formed in a terminal part of the electronic component, which guides~~ configured to guide light shined onto a positioning mark ~~for correcting~~ formed in a terminal part of the electronic component to correct a position offset between the electronic component and a substrate to which the electronic component is to be mounted, wherein

said vacuum chucking part holds the electronic component at a position which is on straight lines substantially parallel to an edge of the electronic component and substantially mutually orthogonal on or over the positioning mark of the electronic component, and which avoids the positioning mark.

2. (Original) The electronic component holding head according to claim 1, further comprising:

a light source provided on said main electronic component holding head, which shines light toward the positioning mark formed on the electronic component held by said vacuum chucking part, via said light path part.

3. (Original) The electronic component holding head according to claim 1, wherein said light path part is a rectangular solid cutout part at a corner of said main

electronic component holding unit.

4. (Original) The electronic component holding head according to claim 1, wherein said light path part is a tapered cutout part at a corner of said main electronic component holding unit.

5. (Original) The electronic component holding head according to claim 4, further comprising:

a light source provided on said main electronic component holding unit, which shines light toward the positioning mark formed on the electronic component held by said vacuum chucking part, via said light path part, wherein

an inclined surface of the cutout part is formed as a reflecting mirror surface, and light emanating from the light source is shined onto the positioning mark from the reflecting mirror surface.

6. (Original) The electronic component holding head according to claim 1, wherein said light path part is a through hole provided in said main electronic component holding unit, which opens toward the positioning mark of the electronic component.

7. (Original) The electronic component holding head according to claim 6, wherein said vacuum chucking part is annularly formed around the outer periphery of the through hole.

8. (Currently Amended) An electronic component holding head for holding an electronic component to be mounted to a substrate, comprising:

a main electronic component holding unit;

a vacuum chucking part provided on said main electronic component holding unit so as to face the surface of the electronic component to be held by vacuum chucking, so that the electronic component is held by vacuum chucking to said electronic component main holding unit; and

a light path part ~~formed in a terminal part of the electronic component, which guides~~
configured to guide light shined onto a positioning mark ~~for correcting~~ formed in a terminal
part of the electronic component to correct a position offset between the electronic
component and a substrate to which the electronic component is to be mounted, wherein

said vacuum chucking part holds the electronic component at a position which is on
a straight line traversing the positioning mark of the electronic component and which avoids
the positioning mark on or over the positioning mark of the electronic component.

9. (Original) The electronic component holding head according to claim 8, further
comprising:

a light source provided on said main electronic component holding head, which
shines light toward the positioning mark formed on the electronic component held by said
vacuum chucking part, via said light path part.

10. (Original) The electronic component holding head according to claim 8,
wherein

said light path part is a rectangular solid cutout part at a corner of said main
electronic component holding unit.

11. (Original) The electronic component holding head according to claim 8,
wherein

said light path part is a tapered cutout part at a corner of said main electronic
component holding unit.

12. (Currently Amended) The electronic component holding head according to
claim 8 11, further comprising:

a light source provided on said main electronic component holding unit, which
shines light toward the positioning mark formed on the electronic component held by said
vacuum chucking part, via said light path part, wherein

an inclined surface of the cutout part is formed as a reflecting mirror surface, and light emanating from the light source is shined onto the positioning mark from the reflecting mirror surface.

13. (Original) The electronic component holding head according to claim 8, wherein

said light path part is a through hole provided in said main electronic component holding unit, which opens toward the positioning mark of the electronic component.

14. (Original) The electronic component holding head according to claim 13, wherein

said vacuum chucking part is annularly formed around the outer periphery of the through hole.

15. (Currently Amended) An electronic component mounting apparatus for mounting an electronic component onto a substrate, comprising:

an electronic component feeding unit, which feeds an electronic component;

an electronic component holding head, which holds the electronic component to be mounted onto a substrate;

an imaging unit, which forms an image of a positioning mark formed at a terminal part of the electronic component held by said electronic component holding head, for correcting a position offset between the electronic component and the substrate to which the electronic component is to be mounted;

a position offset detection unit, which detects a position offset of the electronic component relative to the substrate, based on image data of the positioning mark obtained by said imaging unit;

a position correction unit which, based on the position offset detected by said position offset detection unit, performs control so as to correct the X direction and the Y

direction position offset of the electronic component relative to the substrate, so that the electronic component with the thus corrected position offset is mounted to the substrate, wherein

said electronic component holding head includes:

a main electronic component holding unit;

a vacuum chucking part provided on said main electronic component holding unit so as to face the surface of the electronic component to be held by vacuum chucking, so that the electronic component is held by vacuum chucking to said main electronic component holding unit; and

~~a light path part formed in a terminal part of the electronic component, which guides~~
configured to guide light shined onto the positioning mark for correcting formed in a terminal
part of the electronic component to correct a position offset between the electronic component and the substrate to which the electronic component is to be mounted, wherein

said vacuum chucking part holds the electronic component at a position which is on straight lines substantially parallel to an edge of the electronic component and substantially mutually orthogonal over the positioning mark of the electronic component, and which avoids the positioning mark.

16. (Original) The electronic component mounting apparatus according to claim 15, further comprising:

a receiving stage onto which the electronic component fed from said electronic component feeding unit; and

a second imaging unit forms an image of the positioning mark of the electronic component placed on said receiving stage.

17. (Currently Amended) An electronic component mounting apparatus for mounting an electronic component onto a substrate, comprising:

an electronic component feeding unit, which feeds an electronic component;

an electronic component holding head, which holds an electronic component to be mounted onto a substrate;

an imaging unit, which forms an image of a positioning mark formed at a terminal part of the electronic component held by said electronic component holding head, for correcting a position offset between the electronic component and the substrate to which the electronic component is to be mounted;

a position offset detection unit, which detects a position offset of the electronic component relative to the substrate, based on image data of the positioning mark obtained by said imaging part;

a position correction unit which, based on the position offset detected by said position offset detection unit, performs control so as to correct the X direction and the Y direction position offset of the electronic component relative to the substrate, so that the electronic component with the thus corrected position offset is mounted to the substrate, wherein

said electronic component holding head includes:

a main electronic component holding unit;

a vacuum chucking part provided on said main electronic component holding unit so as to face the surface of the electronic component to be held by vacuum chucking, so that the electronic component is held by vacuum chucking to said main electronic component holding unit; and

a light path part ~~formed in a terminal part of the electronic component, which guides~~
configured to guide light shined onto the positioning mark for correcting formed in a terminal
part of the electronic component to correct a position offset between the electronic component and the substrate to which the electronic component is to be mounted, wherein

said vacuum chucking part holds the electronic component at a position which is on a straight line traversing the positioning mark of the electronic component and which avoids the positioning mark over the positioning mark of the electronic component.

18. (Original) The electronic component mounting apparatus according to claim 17, further comprising:

a receiving stage onto which the electronic component fed from said electronic component feeding unit; and

a second imaging unit forms an image of the positioning mark of the electronic component placed on said receiving stage.

19. (Currently Amended) A method of mounting an electronic component to a substrate, comprising:

feeding an electronic component;

forming an image of a positioning mark for compensation of a position offset between the electronic component and the substrate to which the electronic component is to be mounted;

detecting a position offset of the electronic component relative to the substrate, based on the image data of the positioning mark;

correcting the X direction and Y direction position offset of the electronic component relative to the substrate, based on the detected position offset; and

holding a position offset corrected electronic component by said electronic component holding head and mounting the electronic component to the substrate, wherein

said electronic component holding head includes:

a main electronic component holding unit;

a vacuum chucking part provided on said main electronic component holding unit so as to face the surface of the electronic component to be held by vacuum chucking, so that the

electronic component is held by vacuum chucking to said main electronic component holding unit; and

a light path part ~~formed in a terminal part of the electronic component, which guides~~
configured to guide light shined onto the positioning mark ~~for correcting~~ formed in a terminal
part of the electronic component to correct a position offset between the electronic

component and the substrate to which the electronic component is to be mounted, wherein

said vacuum chucking part holds the electronic component at a position which is on straight lines substantially parallel to an edge of the electronic component and substantially mutually orthogonal on or over the positioning mark of the electronic component, and which avoids the positioning mark.

20. (Currently Amended) A method of mounting an electronic component to a substrate, comprising:

feeding an electronic component;

forming an image of a positioning mark for compensation of a position offset between the electronic component and the substrate to which the electronic component is to be mounted;

detecting a position offset of the electronic component relative to the substrate, based on the image data of the positioning mark;

correcting the X direction and Y direction position offset of the electronic component relative to the substrate, based on the detected position offset; and

holding an electronic component to be position offset corrected by said electronic component holding head and mounting the electronic component to the substrate, wherein

said electronic component holding head includes:

a main electronic component holding unit;

a vacuum chucking part provided on said main electronic component holding unit so

as to face the surface of the electronic component to be held by vacuum chucking, so that the electronic component is held by vacuum chucking to said main electronic component holding unit; and

a light path part formed in a terminal part of the electronic component, which guides light shined onto the positioning mark for correcting a position offset between the electronic component and the substrate to which the electronic component is to be mounted, wherein

said vacuum chucking part holds the electronic component at a position which is on a straight line substantially parallel to an edge of the electronic component and substantially mutually orthogonal on or over line traversing the positioning mark of the electronic component, and which avoids the positioning mark on or over the positioning mark of the electronic component.